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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:                   )  
Giampiero MORINI et al.                    )  
  )  
Serial Number: 10/532,686                   )  
  )  
Group Art Unit: 1796                        )  
  )  
Filed: January 20, 2006                    )  
  )  
Examiner: I. KRYLOVA                        )  
  )  
For: BUTENE-1 COPOLYMERS AND PROCESS    )  
FOR THEIR PREPARATION                    )

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R. §1.132

I, Fabrizio Piemontesi, hereby declare:

1. THAT I am Fabrizio Piemontesi.
2. THAT in October 1987, I received a degree in Chemistry with a concentration in Metallorganic Chemistry from the Università di Milano.
3. THAT in March 1989, I became an employee of Himont Italia S.p.a., located in Ferrara, Italy, which is now Basell Poliolefine Italia S.r.l.

4. THAT I work as a researcher for Basell Poliolefine Italia S.r.l. and former companies for over 20 years in the field of Ziegler Natta catalysis, and I am an inventor on at least 25 patents and an author of at least 35 publications in this area.

5. THAT I am a co-inventor of the above-identified U.S. Patent Application Serial No. 10/532,686 (referred to as, "the present application") entitled Butene-1 Copolymers and Process for Their Preparation, which is the U.S. National Stage of International Application PCT/EP2003/012233, filed November 3, 2003, and which claims priority to European Patent Application No. 02080012.4, filed November 28, 2002, and claims the benefit of U.S. Provisional Patent Application Serial No. 60/431,804, filed December 9, 2002, and I am familiar with the disclosure and claims of the present application.

6. THAT the butene-1 copolymers as disclosed and claimed in the present application unexpectedly have an advantageous balance of properties, including, but not limited to, unexpectedly lower seal initiation temperature values (SIT) as evidenced by films comprising the copolymers.

7. THAT additional Comparative Examples 1c-5c and Example 7 were prepared under my direct supervision, which are attached to this declaration as ATTACHMENT B.

8. THAT the Comparative Examples 1c-5c and Example 7 were prepared and analyzed measuring the comonomer content, isotactic pentads (mmmm%), product of the reactivity ratios ( $r_1 \cdot r_2$ ), and regio errors expressed as 1,4 insertions according to the methods found in the present application, and by using the catalysts and external donors as reported in ATTACHMENT B.

9. THAT Comparative Example 1c, which uses a Ziegler-Natta catalyst with  $TiCl_3$ , is illustrative of the catalysts in Bullard et al. Additionally, as demonstrated in ATTACHMENT B, Comparative Example 1c differs from the catalysts and resultant butene-1 copolymers of the present application in which  $TiCl_4$  is used, given Comparative Example 1c does not produce butene-1 copolymers having product of reactivity ratios values ( $r_1 \cdot r_2$ ) as low as those of the present application, nor does Comparative Example 1c produce butene-1 copolymers having isotactic pentad values as high as the butene-1 copolymers of the present application.

10. THAT Comparative Example 2c, which uses a metallocene catalyst, does not produce butene-1 copolymers having isotactic pentad values as high as those of the present application, as well as produces butene-1 copolymers having a higher amount of 4,1 insertions as demonstrated by measuring insertions on a homopolymer obtained using the same catalyst under the same polymerization conditions.

11. THAT Comparative 3c, which uses a Ziegler-Natta catalyst with  $TiCl_4$  and an external donor vinyltriethoxysilane (VTES) illustrative of Examples 1-4 in Kohyama et al. I (EP 0 172 961) and Examples 1-7 in Kohyama et al. II (EP 0 186 287), differs from the catalysts and resultant butene-1 copolymers of the present application in which branched alkyl or cycloalkyltrimethoxysilanes are used as external donors, given Comparative Example 3c does not produce butene-1 copolymers having isotactic pentad values as high as the butene-1 copolymers of the present application.

12. THAT Comparative Example 4c, which uses a Ziegler-Natta

catalyst with  $\text{TiCl}_4$  and an external donor dicyclopentyl dimethoxysilane illustrative of Example 2 in Tokui et al., differs from the catalysts and resultant butene-1 copolymers of the present application in which branched alkyl or cycloalkyltrimethoxysilanes are used as external donors, given Comparative Example 4c does not produce butene-1 copolymers having isotactic pentad values as high as the butene-1 copolymers of the present application, as well as produces butene-1 copolymers having higher product of reactivity ratios ( $r_1 \cdot r_2$ ).

13. THAT Comparative Example 5c, which uses a Ziegler-Natta catalyst with  $\text{TiCl}_4$  and an external donor cyclohexylmethyl dimethoxysilane illustrative of Examples 1 and 3-5 in Tokui et al., differs from the catalysts and resultant butene-1 copolymers of the present application in which branched alkyl or cycloalkyltrimethoxysilanes are used as external donors, given Comparative Example 5c does not produce butene-1 copolymers having isotactic pentad values as high as the butene-1 copolymers of the present application, as well as produces butene-1 copolymers having higher product of reactivity ratios ( $r_1 \cdot r_2$ ).

14. THAT Example 7 is provided herein to further demonstrate the unexpected results of the butene-1 copolymers and processes to produce the copolymers of the present application with respect to the newly submitted Comparison Examples 1c-5c. Example 7 was produced with a Ziegler-Natta catalyst and external donor under polymerization conditions consistent with the present application, in which two copolymers were obtained (i.e., a butene-1/ethylene copolymer and a butene-1/propylene copolymer). Furthermore, a butene-1 homopolymer was obtained with the same Ziegler-Natta catalyst and external donor under polymerization conditions consistent with the present application.

15. THAT Example 7 and Comparative Examples 1c-5c demonstrate that the catalyst system, including the external donor, according to the present application is different from those found in Bullard et al, Kohyama et al. I, Kohyama et al. II, and Tokui et al., and that these differences produce butene-1 copolymers substantially different than those of Bullard et al., Kohyama et al. I, Kohyama, et al. II, and Tokui et al.

16. THAT the catalyst systems, including the external donors, of the present application produce butene-1 copolymers unexpectedly having an advantageous balance of properties, and that the catalyst systems of Bullard et al, Kohyama et al. I, Kohyama, et al. II, and Tokui et al. do not produce butene-1 copolymers having a combination of the currently claimed product of reactivity ratios ( $r_1 \cdot r_2$ ), isotactic pentad values, and absence of butene 4,1-insertions.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the present application or any patent resulting there from.

Signed this 29<sup>th</sup> day of October, 2009



Fabrizio Piemontesi

## ATTACHMENT B

Example	catalyst	Comonomer mol%	$r_1, r_2$	mmmm%	4,1 ins
<b>Example 7</b>					
PB-1/ethylene copolymer	ZN of the present application <sup>i</sup>	5	1.07	99.23	nm
PB-1/propylene copolymer	ZN of the present application <sup>i</sup>	4.2	1.5	98.8	n.a.
PB-1 Homo-polymer Reference	ZN of the present application <sup>i</sup>	-	-	98.60	0.00
<b>Comparative Example 1c</b>					
PB-1/ethylene copolymer	ZN-TiCl <sub>4</sub> based (illustrative of Bullard et al.)	5	2.14	93.42	nm
<b>Comparative Example 2c</b>					
PB-1/ethylene copolymer	metallocene	3.5	1.34	98.50	nm
PB-1 Homo-polymer	metallocene	-	-	92.30	0.40
<b>Comparative Example 3c</b>					
PB-1 homopolymer	ZN - (with external donor like in Kohyama Example 1) <sup>ii</sup>	-	-	96.57	-
<b>Comparative Example 4c</b>					
PB-1/propylene copolymer	ZN - (with external donor like in Tokui Example 2) <sup>iii</sup>	6.2	1.9	98.2	n.a.
<b>Comparative Example 5c</b>					
PB-1/propylene copolymer	ZN - (with external donor like in Tokui Example 1) <sup>iv</sup>	3.3	1.7	90.7	n.a.

n.a. - not available

nm = not measured, but assumed to be the same as that obtained for the butene-1 homo-polymers prepared under identical polymerization conditions apart from the absence of comonomer (as reported also in the patent description page 12 line 1-3).

i TiCl<sub>4</sub> based with external donor (hexyltrimethoxysilane).ii TiCl<sub>4</sub> based with external donor VTES (vinyltriethoxysilane)iii TiCl<sub>4</sub> based but with external donor D (Dicyclopentyl dimethoxysilane)iv TiCl<sub>4</sub> based but with external donor C (Cyclohexylmethyl dimethoxysilane)